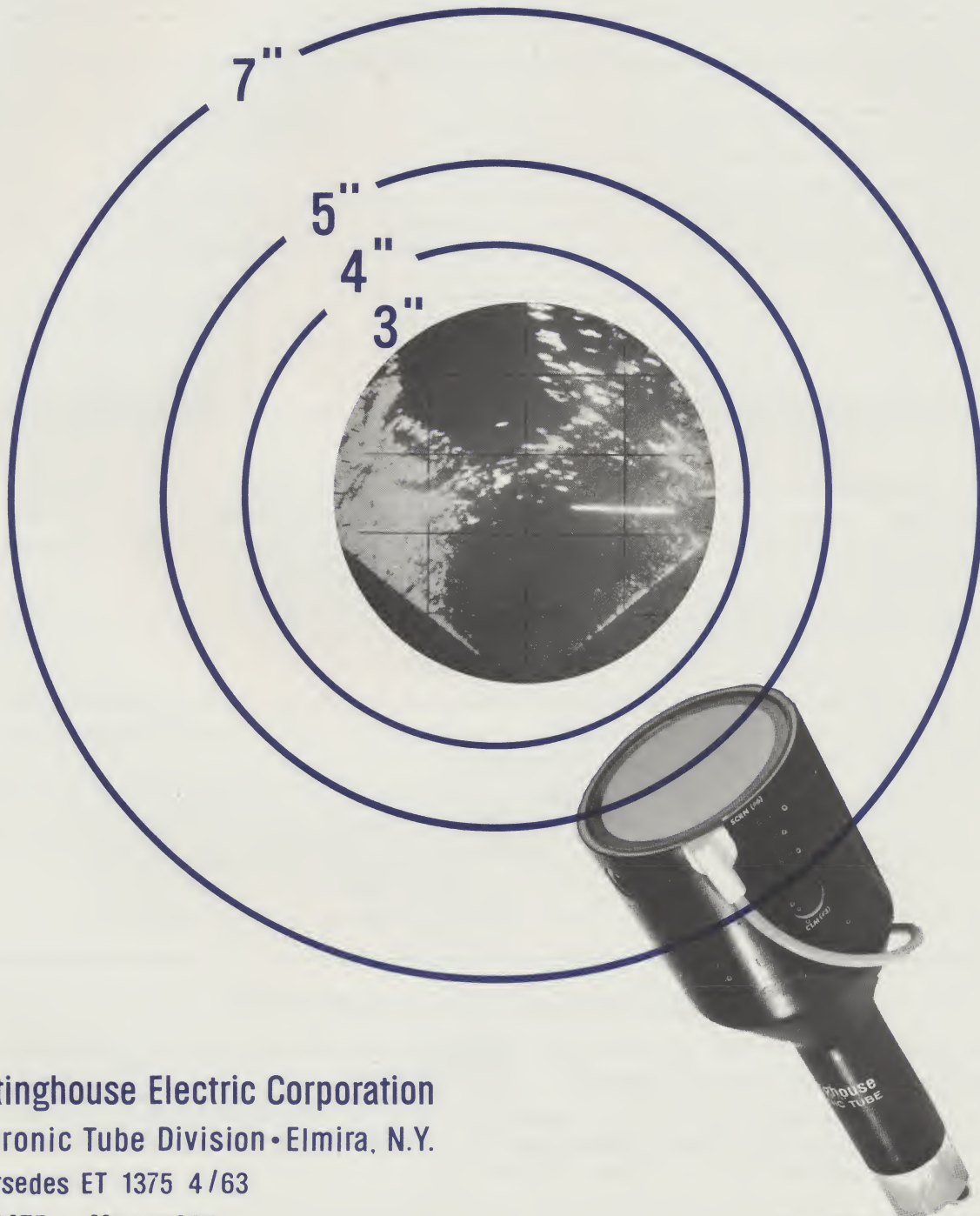


Westinghouse DISPLAY STORAGE TUBES



Westinghouse Electric Corporation

Electronic Tube Division • Elmira, N.Y.

Supersedes ET 1375 4/63

EFF. DATE: May 1965



ELECTRICAL INFORMATION For

Tube Type	WX-30059	WX-5308	WL-7268A	WL-7356	WL-22662
Max. Diameter (Incl. Shield)	3-1/4	4-1/4	5-1/4	5-1/4	5-1/4
Max. Length	10-3/4	11	16	16	15
Min. Useful Screen Dia.	2-1/4	3	4	4	4
No. of Write Guns	2	1	2	2	1
Type of Focus	ES	ES	ES	ES	ES
Type of Deflection	ES	ES	ES	ES	ES
Min. Storage Time	15	30	15	5	60
Min. Writing Speed	1×10^5	1×10^4	4×10^4	3.6×10^4	4×10^5
Max. Erase Time	20	100	50	50	75
Viewing Screen Voltage	5	8	10	10	10
Min. Brightness	500	1200	2200	2500	1000
Min. Resolution	100	50	70	50	50
Special Features	Compact, High Resolution	Compact, High Deflection Sensitivity		Selective Erasure	Long Storage Time

PERFORMANCE LIMITS

The performance limits given above for each tube are not a tube rating, but, are a particular combination, simultaneously available, for that tube. Other parameter combinations are possible, with each tube, for use in applications with different requirements. (See Performance Trade-Off Considerations).

MODIFICATIONS

In addition to the types listed, Westinghouse can also supply modified versions of these Display Storage Tubes with the following ranges of performance not all of which are simultaneously possible. (See Performance Trade-Off Considerations).

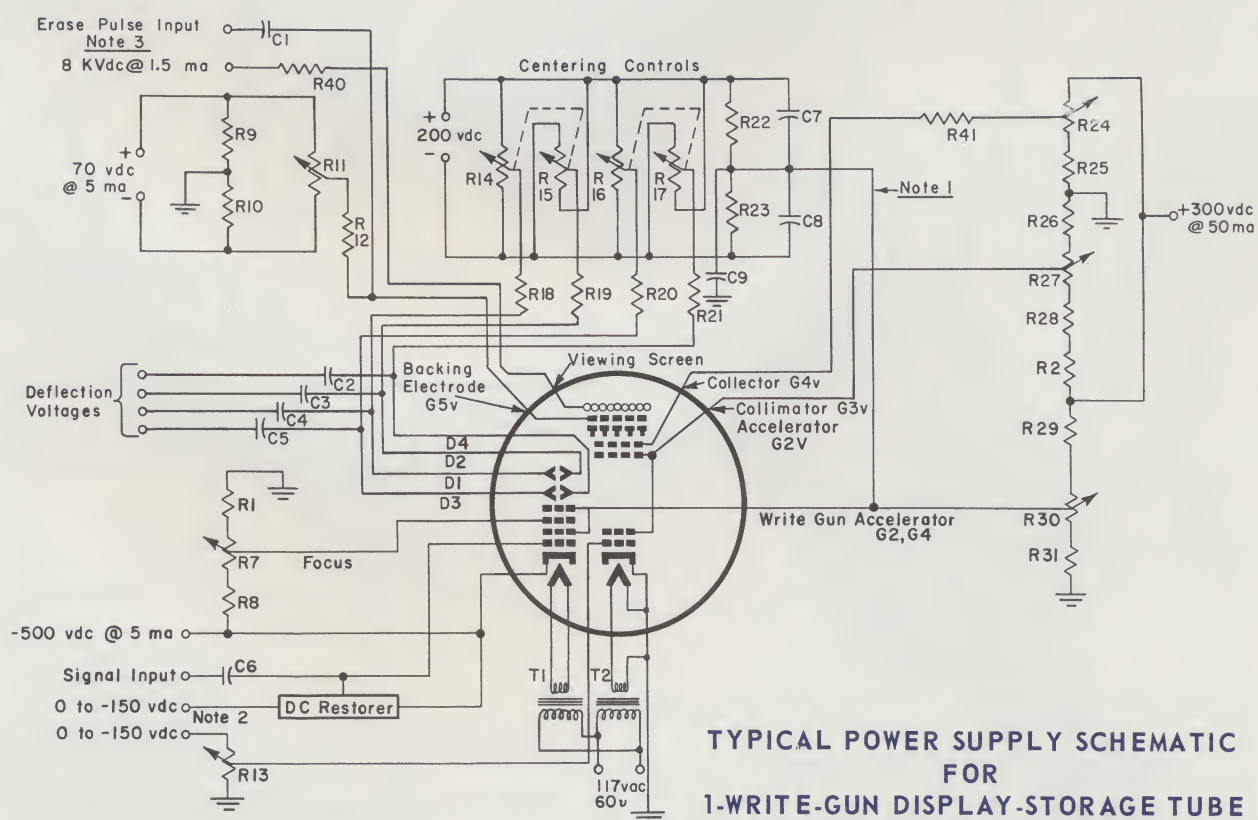
Parameter	Min.	Max.	Units
Storage Time	5	60	Seconds
Writing Speed	5×10^3	1.2×10^6	Inches/Second
Erase Time	6	500	Milliseconds
Resolution	50	130	Lines/Inch

PERFORMANCE TRADE-OFF CONSIDERATIONS

Performance characteristics, of any Display Storage Tube, are inherently interacting, permitting some operating parameters to be increased by decreasing others.

For example: (1) storage time may be increased by reducing display brightness or writing speed and/or increasing erase time. (2) deflection sensitivity may be increased by decreasing accelerating voltage with consequent decrease of resolution.

WX-4363	WX-4584	WX-4851	WX-4951	WX-5047	WX-5314	WX-30154	UNITS
5-1/4	5-1/4	5-1/4	5-1/4	5-1/4	5-1/4	7-3/8	Inches
16	15	15	15	15	15	18-3/8	Inches
4	4	4	4	4	4	5.8	Inches
2	1	1	1	1	1	1	—
ES	ES	ES	ES	ES	ES	ES	—
ES	ES	ES	ES	ES	ES	ES	—
30	6	30	10	10	60	40	Seconds
4×10^4	1.2×10^6	1×10^5	1×10^5	4×10^5	5×10^3	5×10^4	Inches/Second
50	50	50	50	50	100	500	Milliseconds
10	5	5	10	10	5	10	Kilovolts
1500	200	200	1200	1000	200	750	Foot-Lamberts
50	50	100	60	90	90	45	Lines/Inch
	High Writing Speed	High Resolution	High Contrast	High Resolution	Low Writing Speed, High Resolution		





MECHANICAL DATA

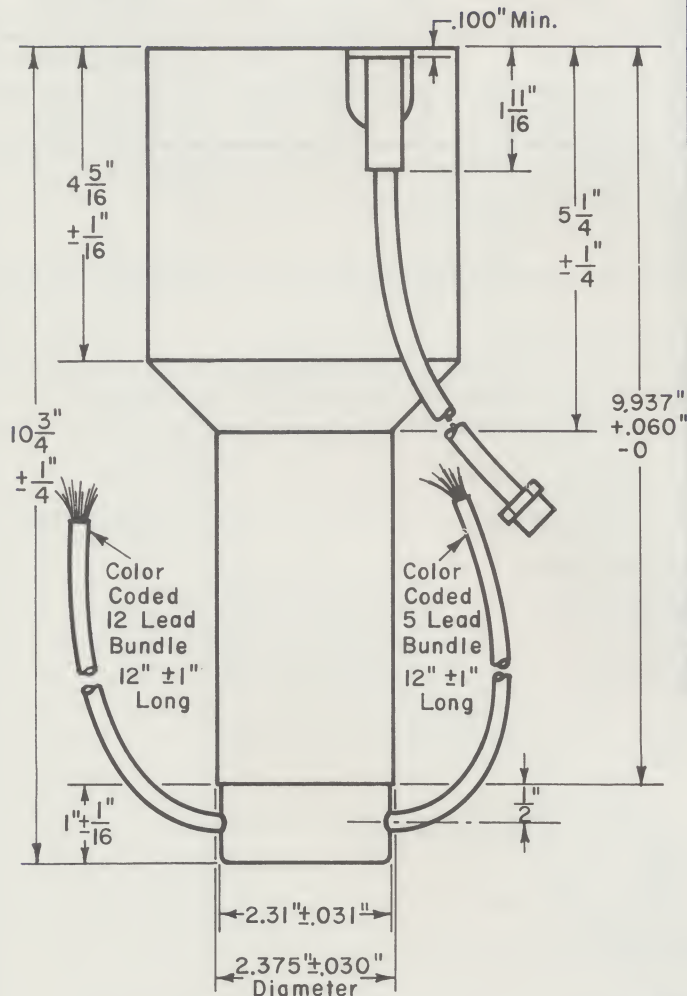
ENVIRONMENTAL

Westinghouse Display Storage Tubes are supplied with integral magnetic shields with a resilient filling to the tube envelope. Resulting protection against mechanical shock, vibration, humidity and inter-terminal leakage permits operation in airborne or mobile applications with a high degree of reliability. The environmental capability of each type is detailed in its individual data sheet.

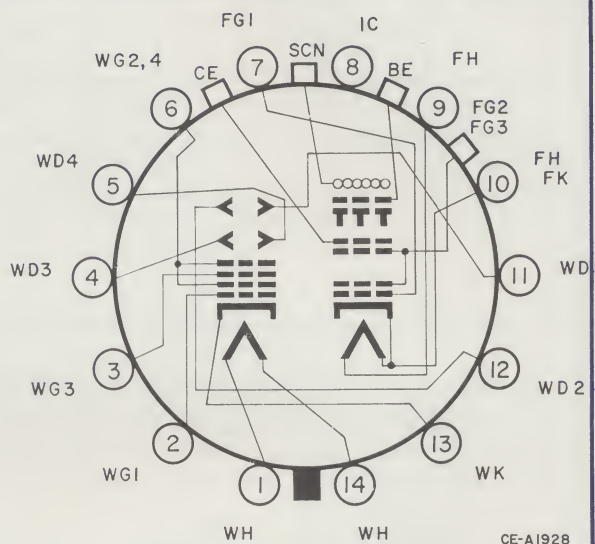
FLOOD-GUN OPTICS

Westinghouse Display Storage Tubes have flood-gun optics as an integral part of the bulb. This unique construction has the following decisive advantages:

1. Elements integral with a glass cylinder are inherently more rugged and reliable than metal elements supported by the same glass cylinder.
2. A larger useable screen diameter in a given bulb size is possible.
3. Only one (1) adjustable voltage is required for proper collimation.



OUTLINE & INDEX OF LEADS
FOR
TYPICAL 1-WRITE-GUN TUBE
WITH
FLYING LEADS (WX-5308)



SCHEMATIC
OF
TYPICAL 1-WRITE-GUN TUBE
WITH
BASE (WX-4851)

INDEX OF LEADS

12 Lead Group

White/Black	.....	D3
White/Red	.....	D4
Orange	.....	G2, G4 (W)
Green	.....	G1 (F)
Yellow	.....	Heater (F)
White/Yellow	.....	Heater, Cathode(F)
White/Green	.....	D1
White/Orange	.....	D2
Black	.....	Shield Ground
Light Blue	.....	G2, G3(F) Collimator
Red	.....	G4(F) Collector
Violet	.....	Backing Electrode

5 Lead Group

Brown	.....	Heater (W)
White	.....	G1 (W)
Gray	.....	Cathode (W)
White/Blue	.....	G3 (W)
White/Brown	.....	Heater (W)

March 15, 1965

3" HIGH RESOLUTION IMAGE PICKUP TUBE TYPE WL-23111

3000 TV Line Resolution
14 Shade Gray-Scale Rendition
Short Rise & Decay Time
Capable of Digital Readout

Rugged & Reliable
Simple Circuitry
Electronic Zoomar
Mag. Focus & Deflection

The WL-23111 is an extremely high resolution image pickup tube, with excellent gray-scale rendition and absence of lag, ideal for microfilm readout, TV film cameras and high-speed flying spot scanning.

The WL-23111 uses the image dissector principle and is inherently more rugged and longer-lived because it has no target or hot cathode to deteriorate. Circuitry is simpler because there is no beam-forming gun. Standard I.O. components may be used when scan rates permit.

ELECTRICAL

Direct Interelectrode Capacitance:
Anode to All Other Electrodes 4.2 pF
Photocathode:
Spectral Response (See Fig.) S-20
Sensitivity (Minimum) 180 μ A/Lumen
Multiplier Current Amplification (Note 1). 1×10^6
Focusing Method Magnetic
Deflection Method Magnetic

MECHANICAL

Overall Length 20" $\pm$ 1/4"
Diameter:
Image End 3" $\pm$ 1/16"
Neck (At Largest Part) 2.275" Max.
Useful Centered Image (Max.) 1.6"
Shoulder Base Keyed Jumbo Annular, 7-Pin
End Base EIA Group 5, 14-Pin Base No. B14-45
Operating Position Any
Net Weight (Approx.) 1-1/2 Pounds

MAXIMUM RATINGS

Absolute Maximum Values (Note 2)

Photocathode:
Voltage -3500 max. Volts
Current (Note 3). 4.0 max. μ Ampere
Operating Temperature 75 max. °C
Grid 6 Voltage -3000 max. Volts
Focus Electrode Voltage -2600 max. Volts
Grid 5 Voltage -2600 max. Volts
Grid 4 Voltage -2600 max. Volts
Grid 3 & Resolving Aperture Voltage -2600 max. Volts
Dynode 1 Voltage -2600 max. Volts
Inter-Dynode Voltage 200 max. Volts

TYPICAL OPERATION (Note 2)

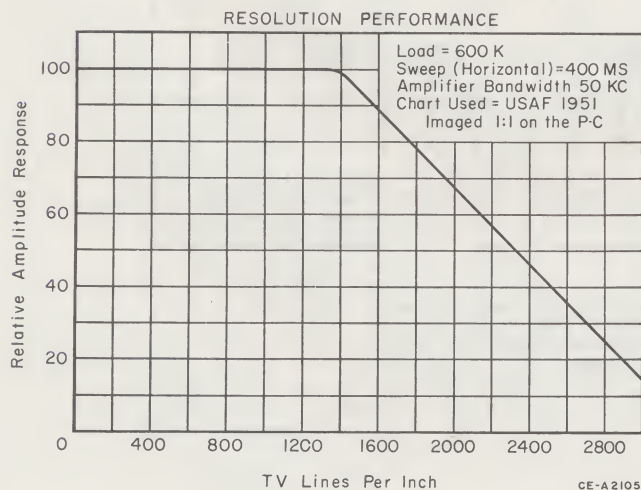
Photocathode Voltage -2850 Volts
Photocathode Current (Note 3). 2.0 μ Ampere
Grid 6 Voltage (Note 4). -2400 Volts
Focus Electrode Voltage -2000 to -2350 Volts
Grid 5 Voltage -1800 Volts
Grid 4 Voltage -1800 Volts
Grid 3 & Resolving Aperture Voltage -1800 Volts
Dynode 1 Voltage -1800 Volts
Interdynode Voltage 150 Volts
Mag. Focus Field Strength 75 Gauss

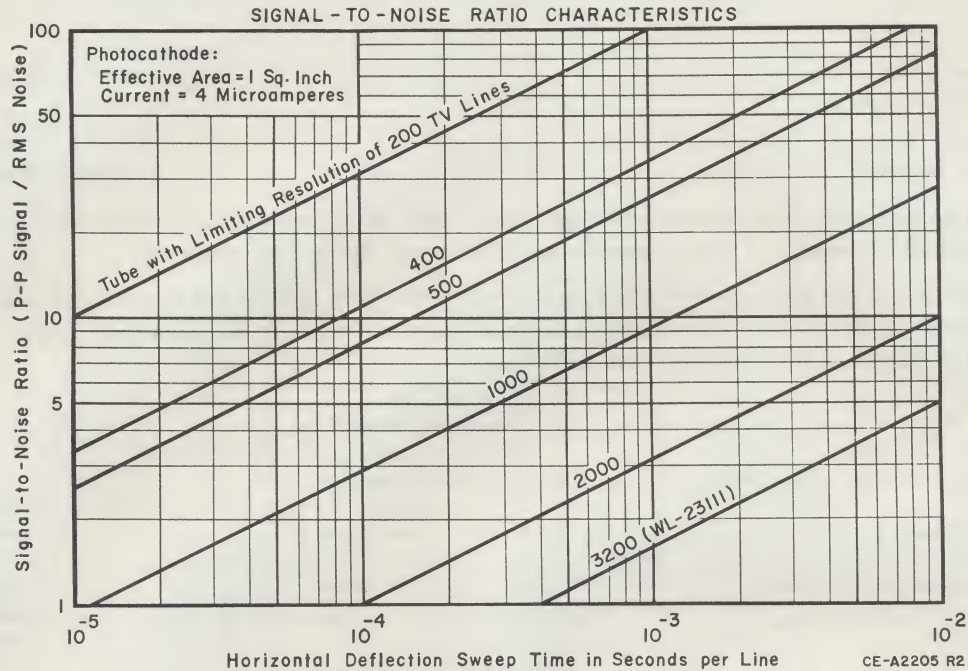
NOTES

1. Measured with 140 volts per stage.
2. Voltages are with respect to anode. Basic power supply requirements are shown in drawing.
3. Measured with uniform illumination on 1 square-inch of photocathode.
4. Adjust for optimum focus.

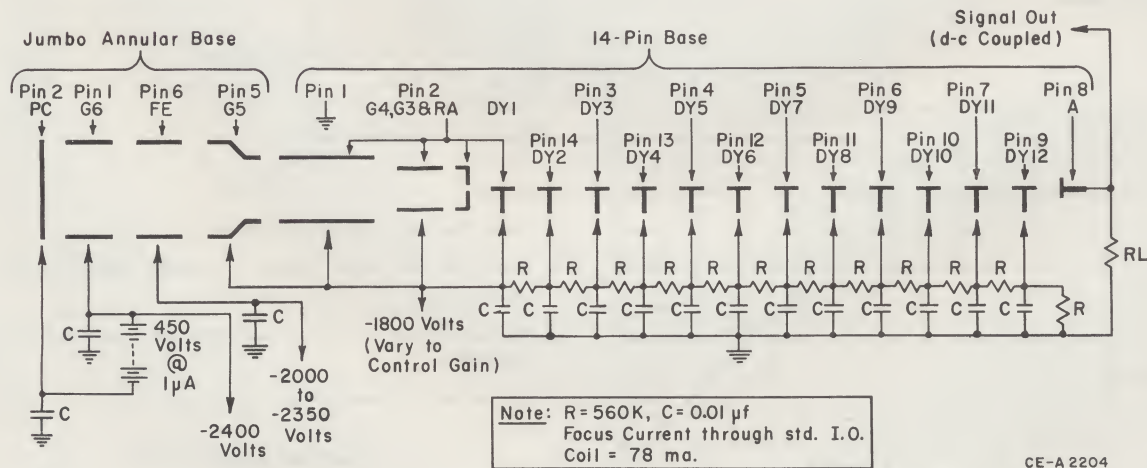
LIMITING RESOLUTION

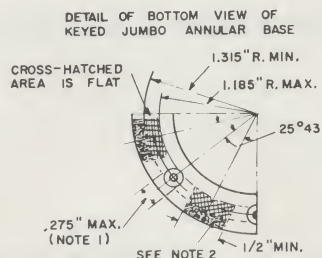
The resolution capability of image dissector camera tubes is determined by an internal aperture and is therefore an inherent characteristic of the tube. The limiting resolution of the WL-23111 is 3200 TV lines per inch. Other image dissector camera tubes are available from Westinghouse having different values of limiting resolution.





TYPICAL OPERATING CIRCUIT



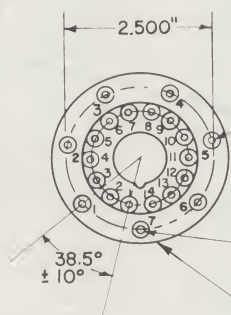


NOTE 1: MEASURED AT DISTANCE OF $1/32$ " BELOW BOTTOM OF ANNULAR BASE.
NOTE 2: DOTTED AREA IS FLAT OR EXTENDS TOWARD DIHEPTAL BASE END OF TUBE BY 0.060 " MAX.

KEYED ANNULAR BASE GUIDE

ANGULAR VARIATIONS BETWEEN PINS AS WELL AS ECCENTRICITY OF NECK CYLINDER WITH RESPECT TO PHOTOCATHODE CYLINDER ARE HELD TO TOLERANCES SUCH THAT PINS AND NECK CYLINDER WILL FIT FLAT-PLATE GAUGE WITH:

- A- SIX HOLES HAVING DIA. OF 0.065 ± 0.001 " AND ONE HOLE HAVING DIA. OF 0.150 ± 0.001 ". ALL HOLES HAVE DEPTH OF 0.265 ± 0.001 ". THE SIX 0.065 " HOLES ARE ENLARGED BY 45° TAPER TO DEPTH OF 0.047 ". ALL HOLES ARE SPACED AT ANGLES OF $51^\circ 23' \pm 5'$ ON CIRCLE DIA. OF 2.500 ± 0.001 ".
- B- SIX STOPS HAVING HEIGHT OF 0.187 ± 0.001 ", CENTERED BETWEEN PIN HOLES, TO BEAR AGAINST FLAT AREAS OF BASE.
- C- RIM EXTENDING OUT A MINIMUM OF $1/8$ " FROM $2-13/16$ " DIA. AND HAVING HEIGHT OF 0.126 ± 0.001 ".
- D- NECK CYLINDER CLEARANCE HOLE HAVING DIA. OF 2.200 ± 0.001 ".



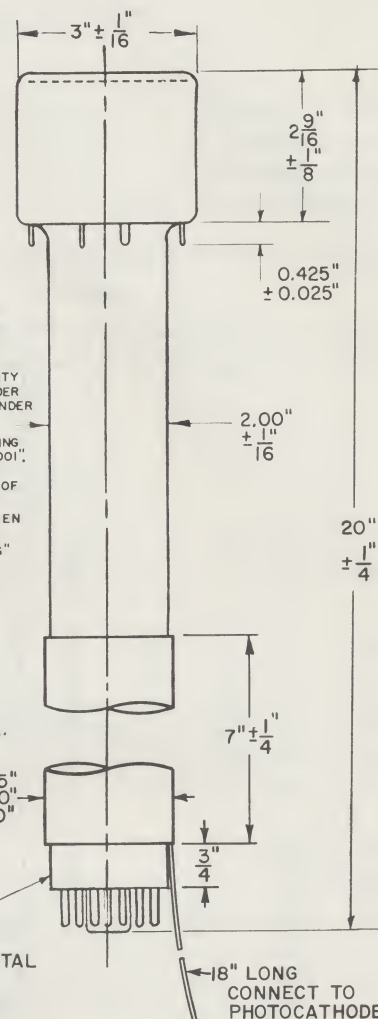
6 PINS
 0.040 ± 0.002 " DIA.

2.275 ± 0.000 "
 -0.010 "

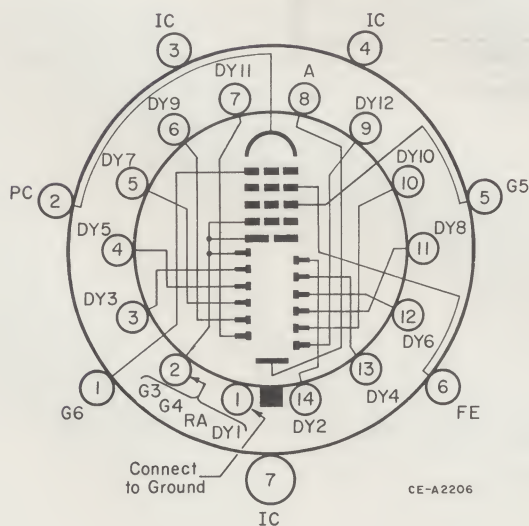
1 PIN
 0.093 ± 0.003 "

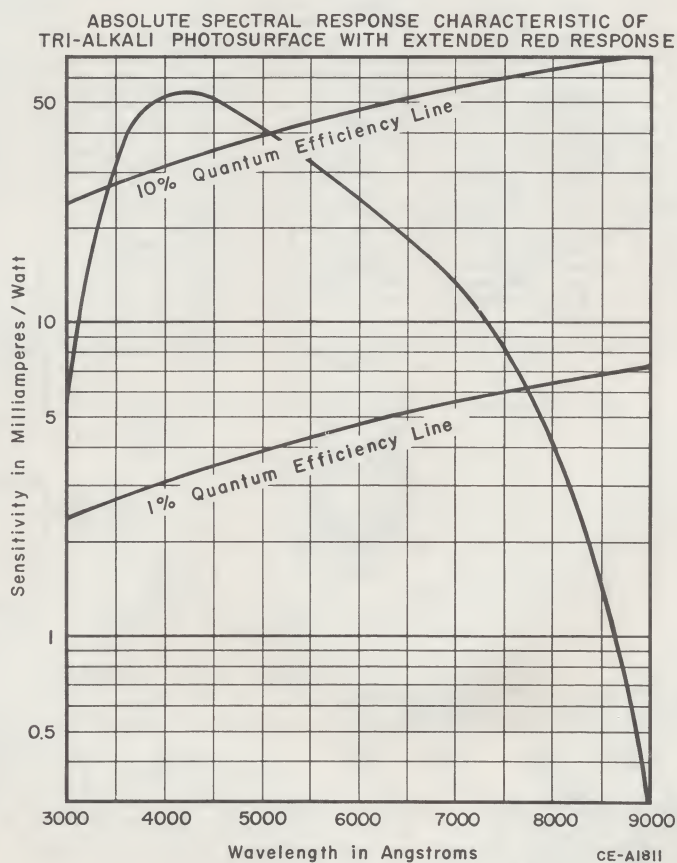
SMALL SHELL DIHEPTAL
14 PIN BASE
JETEC NO B14-45

Direction of Incident Light should be approximately Parallel to Tube Axis toward the Large End (Faceplate)



CE-A2247





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WESTINGHOUSE ELECTRIC CORPORATION, ELECTRONIC TUBE DIVISION, ELMIRA, NEW YORK

WESTINGHOUSE SEC CAMERA TUBES

TUBE SILHOUETTE	TUBE TYPE	PHOTOCATHODE DIAMETER	TARGET DIAMETER	IMAGE SECTION FOCUS	READING SECTION FOCUS	DEFLECTION	LENGTH	DIAMETER	WEIGHT (gm)	PHOTOCATHODE CURVATURE	PHOTOCATHODE TYPES UNDER DEVELOPMENT	RESOLUTION (TV Lines/ Picture Height)		SHUNT CAPACITY (pF)	SIMILAR TUBE TYPES
												Best	Typical		
	WX-30152	1.0"	1.0"	E	E	M	12.0"	2.4"	300	S	S-20/F0			37	WX 30152 (4w heater) WX 30610 (1V heater)
	WX-31189	1.0"	0.625"	E	M	M	8.5"	2.8"	280	S	S-20/quartz S-20/F0 Cs ₂ Te/quartz			23	
	WX-31034	0.625"	0.625"	E	E	M	8.7"	2.3"	220	S	S-20/F0			22	WX-31034 (F0-C) WX-30516 (F0-U) WX 30676 (F0-C) (Note 1)
	WX-31003A	1.0"	0.625"	E	E	M	10.0"	2.8"	300	S	Cs ₂ Te/quartz S-9/quartz S-20/quartz	500	400	23	WX-31003A (S-20/quartz) WX-31003 (S-9/quartz) WX-31003 (Cs ₂ Te/quartz)
	WX-31380	1.0"	1.0"	M	M	M	12.0"	2.2"	250	F	S-20/F0 S-20/glass Cs ₂ Te/quartz	800	700	37	WX-31380 (glass) WX-31123 (F0-C) WX-31166 (Cs ₂ Te/quartz)
	WX-54198	1.6"	1.6"	M	M	M	17"	3.2"	500	F	S-20/glass S-20/F0	1000	900	50	WX-54198 (Note 2) WX-31222 (Note 3) WX-31223 (F0-C)
	WX-31077	1.0"	0.625"	E	E	E	11.5"	2.7"	380	S	Cs ₂ Te/LiF CsI/LiF	70 μ m image diameter at the half - amplitude level with a point source		—	
	OSSEC	1.0"	1.0"	M	M	—	3.5"	2.4"	190	F	S-9/glass	70	1p/mm	—	

- NOTES
1. Less documentation required.
 2. Developmental tube with glass and fiber optic faceplate.
 3. Production version of the WX-54198.

SYMBOLS

Photocathode curvature: S - Spherical, F - Flat
 Faceplate material: F0 - Fiber Optic, F0-C - Classified
 Deflection focus: E - Electrostatic, M - Magnetic

WESTINGHOUSE SEC CAMERA TUBES

[illegible]